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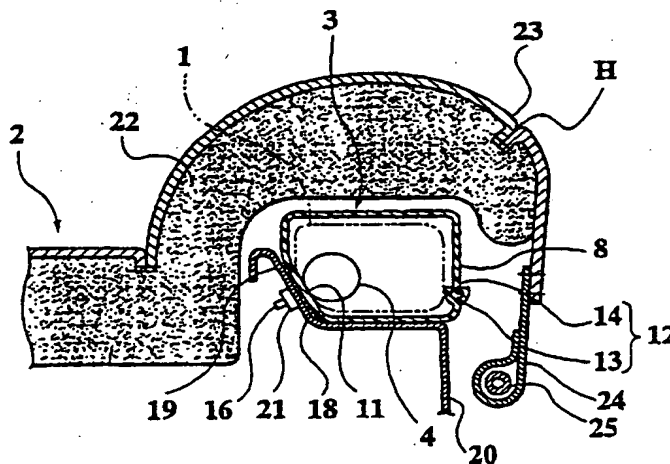
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**(54) AIR BAG DEVICE FOR SIDE COLLISION OF AUTOMOBILE**

(57) An air bag device for a side collision of an automobile, comprising a housing (3) having a tubular side surface portion (8) formed of an extrusion molded product, an air bag (1) and an inflator (4) stored in the interior of the housing (3), a seat back frame (20), to which the housing (3) is fixed, provided on the end portion of a

seat which is on the outer side of the automobile, and a tear-open section (12) provided in the side surface portion (8) of the housing (3) and formed of mutually engageable both end portions (13, 14) of the housing (3).

**FIG.2**



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## Description

### Technical Field

[0001] The present invention relates to an air bag apparatus for lateral collision of an automobile.

### Background Art

[0002] As an air bag apparatus for lateral collision of an automobile, there is one of a type where an air bag is developed forwards from an outer end portion, in a vehicle transverse direction, of a seat back to protect a vehicle occupant (refer to Japanese Patent Application Laid-Open No. 9-136598 as a similar art).

[0003] An air bag apparatus of this type has a structure where an air bag and an inflator are accommodated in a metallic container opened at a front side thereof. The air bag breaks through the seat back to develop forwards by gas injected from the inflator.

[0004] However, such a prior art is disadvantageous regarding weight because a metallic container is used for accommodating an air bag. Also, when a vehicle occupant sits on a seat, the occupant feels a foreign matter at his/her back because the metallic container is hard. Furthermore, since the air bag may be injured by end edge of an opening portion of the metallic container, it is necessary to conduct a heming process on the end portion of the opening portion, which results in trouble work in manufacture of the metallic container.

[0005] The present invention has been achieved in view of such a prior art, and provides an air bag apparatus for lateral collision of an automobile which can be reduced in weight and does not give a feeling of foreign matter to the back of a vehicle occupant.

### Disclosure of Invention

[0006] The aspect of the present invention is an air bag apparatus comprising a housing formed of a synthetic resin and fixed to an outer end portion, in a vehicle transverse direction, of a seat back, an air bag and an inflator accommodated in the housing, and a splitting-opening portion which is configured by end portions opposed to be engaged with each other when the air bag is accommodated in the housing. The air bag projects through the splitting-opening portion as the air bag is expanded and developed.

[0007] According to the above arrangement, as a housing formed of the synthetic resin is used instead of a metallic container, the weight of the air bag apparatus can be reduced. Also, as the housing is deformable when it is pressed, there is no fear that the air bag apparatus gives a feeling of foreign matter to the back of a vehicle occupant. Since the splitting-opening portion where the end portions are engaged with each other is provided in the housing, the air bag is developed from a predetermined portion (the splitting-opening portion) of

the housing without fail, so that the developing behavior of the air bag is made stable.

[0008] The housing may be formed in one piece covering peripheries of the air bag and the inflator to accommodate the same, and the splitting-opening portion can be formed by engaging end portions of the housing of the one piece with each other.

[0009] According to the above arrangement, as the housing is one piece, it can easily be manufactured.

[0010] The splitting-opening portion may have a structure where a hook portion formed at one end of the housing and a recessed portion formed at the other end thereof are engaged with each other.

[0011] According to the above arrangement, since the splitting-opening portion is configured by the hook portion formed at the one end of the housing and the recessed portion at the other end, an engaging force of the splitting-opening portion can easily be adjusted by changing the shapes and sizes of the hook portion and the recessed portion. Accordingly, the engaging force of the splitting-opening portion can easily be set to be an optimal magnitude in which the splitting-opening portion is not opened easily and it is opened securely when the air bag is developed.

[0012] The splitting-opening portion may be provided at an outer side position, in the vehicle transverse direction, of the housing fixed to the seat back.

[0013] According to the above arrangement, as the splitting-opening portion is provided at the outer side position, in the vehicle transverse direction, of the housing, the splitting-opening portion is positioned along the longitudinal direction of a vehicle. Accordingly, the pressure acting on the splitting-opening portion from the back of the vehicle occupant due to a normal use of the seat back acts so as to engage the hook portion and the recessed portion with each other, so that the splitting-opening portion is prevented from being opened due to a normal use of the seat back.

[0014] The splitting-opening portion may be arranged at the rear side of the outer side position of the housing.

[0015] According to the above arrangement, the splitting-opening portion is arranged at the rear side of the outer side position, the vehicle occupant side face of the housing opened to extend forward by development of the air bag is elongated. Accordingly, the occupant side face of the housing which has extended forward serves as a guide for developing the air bag forward, and also serves so as to prevent the vehicle occupant and the air bag expanding rapidly from directly contacting with each other.

### Brief Description of Drawings

[0016]

Fig. 1 is a side view showing an air bag apparatus for lateral collision according to an embodiment of the present invention;

Fig. 2 is a sectional view showing a non-development state of an air bag taken along arrow II-II in Fig. 1;

Fig. 3 is an exploded perspective view showing an inside structure of a housing;

Fig. 4 is a sectional view showing a developed state of the air bag and which corresponds to Fig. 2; and Fig. 5 is an enlarged view showing arrow DA portion in Fig. 3.

#### Best Mode for Carrying Out the Invention

[0017] An embodiment of the present invention will be described with reference to the drawings below.

[0018] First, a structure of an air bag 1 will be described on the basis of Fig. 1. A housing 3 is built in the right side end portion of a seat back 2 of a rear seat. The air bag 1 and an inflator 4 are accommodated in the housing 2.

[0019] The air bag 1 is formed in an almost L shape and is provided inside with a partition wall cloth partitioning an inside space of the air bag 1 into a breast protecting portion A at a lower side and a head protecting portion B at an upper portion. A vent hole 6 is formed at a front side of the partition wall cloth 5.

[0020] Injecting holes 7 are formed at a side face and lower portion of the inflator 4. Gas G injected from the injecting holes 7 first enters in the breast protecting portion A to develop the breast protecting portion A forward. Thereafter, the gas G in the breast protecting portion A flows into the head protecting portion B through the vent hole 6, so that the head protecting portion B is developed upwardly.

[0021] Next, the structure of the housing 3 and a mounting structure to the seat back 2 will be described on the basis of Figs. 2 to 5.

[0022] The housing 3 is configured with a cylindrical side face portion 8 extrusion molded with synthetic resin, and an upper cover 9 and a lower cover 10 made of synthetic resin. The side face portion 8 has an approximately rectangular cross-sectional configuration with an oblique side portion 11 formed partially thereof, and is provided at a vehicle transverse outer side and rear side portion with a splitting-opening portion 12.

[0023] The splitting-opening portion 12 has a structure where a hook portion 13 with an arrowhead-shaped cross section formed at one end of the side face portion 8 and a groove 14 with an arrowhead-shaped cross section formed at the other end as a recessed portion are engaged with each other. An engaging force in the splitting-opening portion 12 can easily be adjusted in accordance with the shapes and sizes of the hook portion 13 and the groove portion 14. In this embodiment, the engaging force is set to be a optimal one where the splitting-opening portion 12 is not opened easily against the pressure acting from the back of the vehicle occupant during a normal use of the seat back 2 and it is securely opened when the air bag 1 is developed.

[0024] Since the splitting-opening portion 12 thus structured is formed at a vehicle transverse outer side position of the side face portion 8, it is positioned along a vertical direction of the vehicle. Therefore, the pressure from the back of the vehicle occupant during a normal use of the seat back 2 acts on the hook portion 13 and the groove portion 14 in a direction in which the both are engaged with each other. Accordingly, the splitting-opening portion 12 is prevented from being opened when the seat back 2 is ordinarily used.

[0025] As shown in Fig. 3, The inflator 4 is accommodated within the housing 3 in a state where it is inserted in a protecting pipe 15. A pair of upper and lower bolts 16 formed on the protecting pipe 15 projects outside from passing-through holes 17 of the oblique face portion 11. The projecting bolt 16 is provided with a temporarily retaining ring 18 (refer to Fig. 2). The housing 3 where the air bag 1 and the inflator 4 are accommodated is handled as one module.

[0026] A seat back frame 20 with an oblique face portion 19 corresponding to the oblique face portion 11 is disposed at the right side end portion of the seat back 2. The bolts 16 are made to pass through the oblique face portion 19 to be fixed to the seat back frame 20 by a nut 21, so that the mount of the housing is completed.

[0027] A pad 22 and an outer skin cover 23 of the seat back 2 are disposed forward of the housing 3 so as to surround the housing 3. A sewn portion H of the outer skin cover 23 positioned at an outermost side, in the vehicle transverse direction, thereof constitutes a splitting-opening portion in the outer skin cover 23, and is sewn with a thread weaker than that in the other sewn portion. Furthermore, the outer skin cover 23 at the vehicle transverse outermost side is connected to a pipe frame 35 through a reinforcing cloth 24. Accordingly, the outer skin cover 23 is securely opened and split at the sewn portion H.

[0028] When gas G injected from the inflator 4 at a time of side collision of the vehicle, the air bag 1 is expanded in the housing 3 and the engagement of the splitting-opening portion 12 is disengaged, so that the housing 3 is put in an opened state. Since the splitting-opening portion 12 has a structure where the hook portion 13 and the groove portion 14 are engaged with each other, the air bag 1 is necessarily developed from the splitting-opening portion 12. Accordingly, the developing behavior of the air bag 1 is made stable.

[0029] The air bag 1 pressing and opening the splitting-opening portion 12 to develop forward further presses and breaks the pad 22 and the sewn portion H of the outer skin cover 23 to develop forward. Since the housing 3 itself is made of synthetic resin, it is relatively soft. However, as the housing 3 is disposed at a vehicle body side wall 26 of a seat close to a vehicle body side wall 26, a vehicle side portion of the air bag 1 is guided by the vehicle body side wall 26 and a vehicle occupant side portion of the air bag 1 is guided by a vehicle occupant side face 27 (refer to Fig. 4) of the housing 3 which

has been opened and split to extend forward. Accordingly, even when the housing 3 is relatively soft, the air bag can be led sufficiently forward.

[0030] Particularly, since the splitting-opening portion 12 is provided at the vehicle transverse outer side and rear side position in the side face portion 8, the vehicle occupant side face 27 of the housing opened to extend forward by development of the air bag 1 is elongated, so that the air bag 1 developed forward is guided forward by the vehicle occupant side face 27. Also, the air bag 1 expanded rapidly and the vehicle occupant are prevented from directly contacting with each other by the vehicle occupant side face 27. Furthermore, the vehicle occupant side face 27 is long, so that it has a strong force pressing to break the pad 22 and the outer skin cover 23, or the like is large.

[0031] According to this embodiment, as the synthetic resin cover extrusion molded is used as the housing 3, weight can be reduced as compared with a conventional metallic container. Also, since the synthetic resin cover is easily deformed when it is pressed, there is no fear that a feeling of foreign matter is given to the back of the vehicle occupant. Furthermore, as the synthetic resin cover can be formed by an extrusion molding, it can easily be manufactured.

#### Industrial Applicability of the Invention

[0032] As mentioned above, according to the present invention, as the housing formed of synthetic resin is used, the weight of the air bag apparatus for lateral collision is reduced. Also, the housing can easily be deformed, there is no fear that it gives a feeling of foreign matter to the back of a vehicle occupant. The splitting-opening portion structured with the end portions engaged with each other is provided in the housing, the air bag is developed necessarily at a predetermined position (the splitting-opening portion), the developing behavior of the air bag is made stable.

[0033] Accordingly, the present invention is useful for an air bag apparatus for lateral collision of an automobile.

#### **Claims**

1. An air bag apparatus for lateral collision of an automobile comprising:

a housing formed of synthetic resin and fixed to an end portion, in a vehicle transverse outer side direction, of a seat back;

an air bag and an inflator accommodated in the housing; and

a splitting-opening portion comprising end portions of the housing engaged with each other in an opposing manner as the air bag is accommodated, and the air bag projecting through the splitting-opening portion as the air bag is

expanded and developed.

2. An air bag apparatus for lateral collision of an automobile according to claim 1, wherein

the housing is formed in one piece so as to surround peripheries of the air bag and the inflator to accommodate the air bag and the inflator, and

the splitting-opening portion is formed by engaging the end portions of the housing formed in the one piece with each other.

3. An air bag apparatus for lateral collision of an automobile according to claim 2, wherein

the splitting-opening portion has a structure where a hook portion formed at one end portion of the housing and a recessed portion formed at the other end portion are engaged with each other.

4. An air bag apparatus for lateral collision of an automobile according to claim 1, wherein

the splitting-opening portion is provided at a vehicle transverse outer side position of the housing fixed to the seat back.

5. An air bag apparatus for lateral collision of an automobile according to claim 4, wherein

the splitting-opening portion is arranged at a rear side of the vehicle transverse outer side position.

6. An air bag apparatus for lateral collision of an automobile according to claim 1, wherein

the housing is a cylindrical extrusion-molded produce.

7. An air bag apparatus for lateral collision of an automobile according to claim 1, wherein

the splitting-opening portion is formed along a longitudinal direction of the housing.

8. An air bag apparatus for lateral collision of an automobile according to claim 1, wherein

the splitting-opening portion is formed at a side face of the housing.

9. An air bag apparatus for lateral collision of an automobile according to claim 1, wherein

the housing is fixed to the seat back by the

inflator.

10. An air bag apparatus for lateral collision of an automobile, characterized in that an air bag and an inflator are accommodated in a housing formed of synthetic resin, the housing having end portions opposing to each other as the air bag is accommodated, and the opposing end portions are engaged with each other so as to be disengaged from each other as the air bag is expanded and developed.

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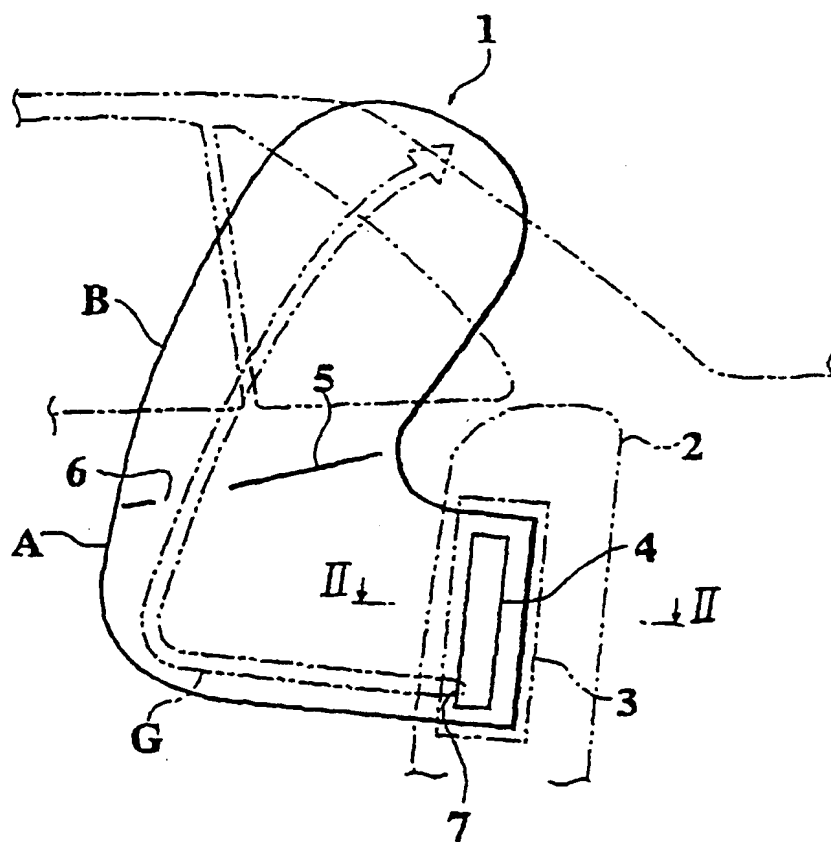
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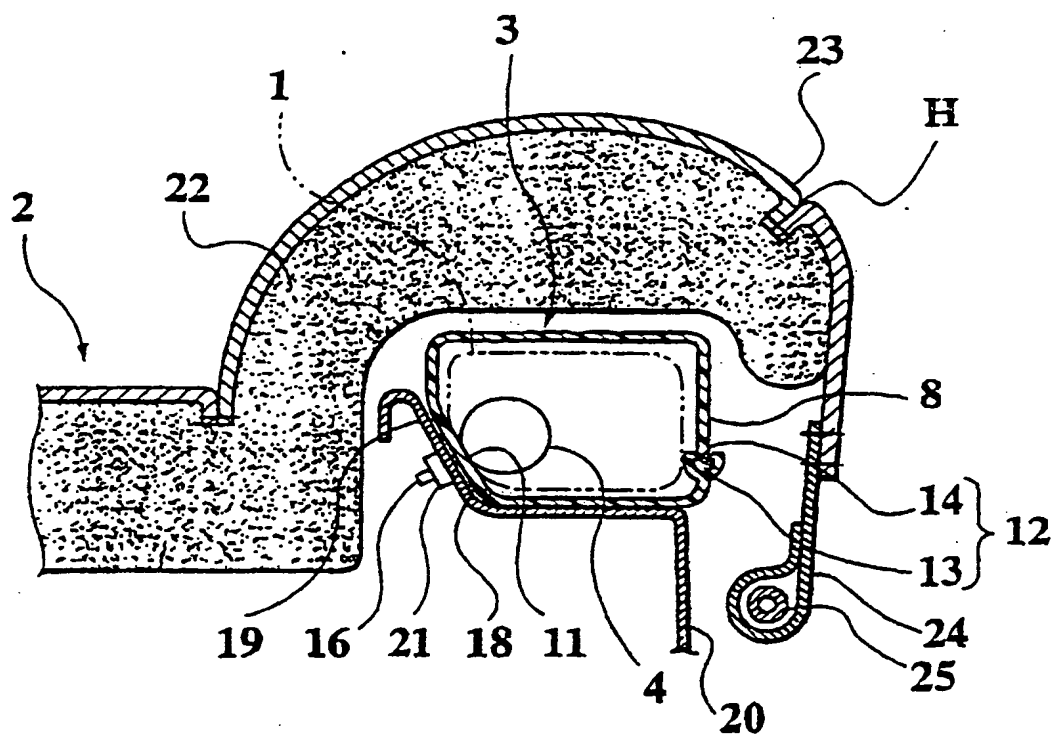
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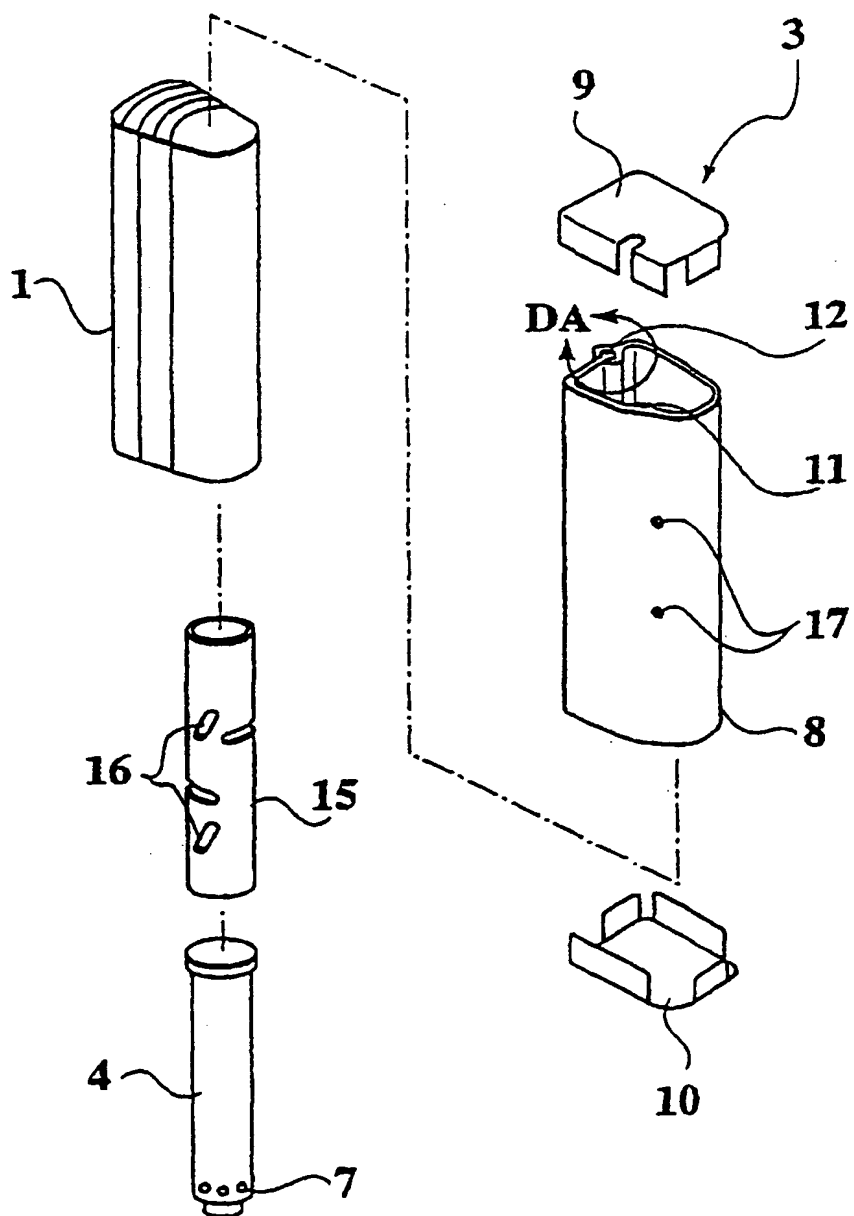
**FIG.1**



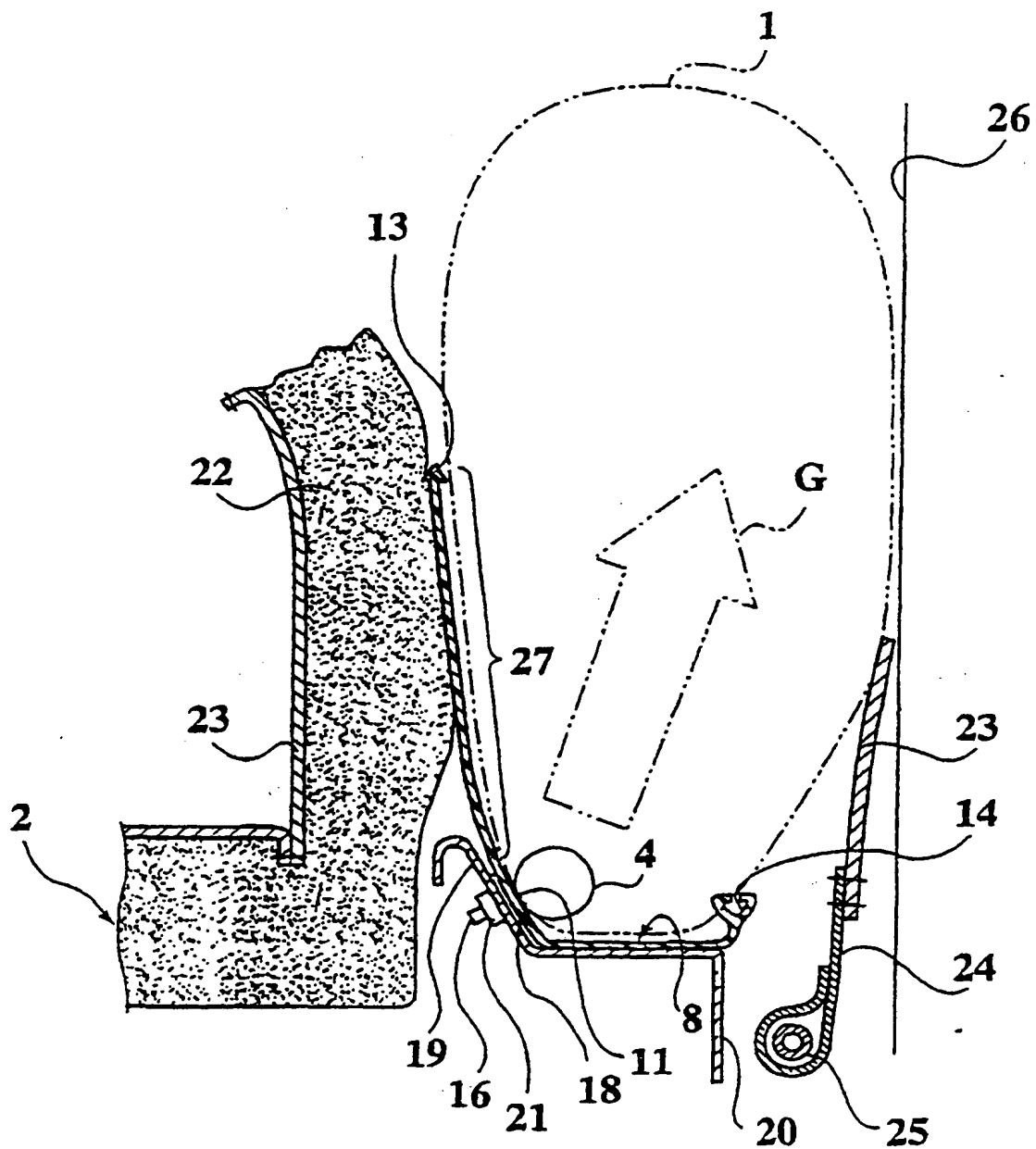
**FIG.2**



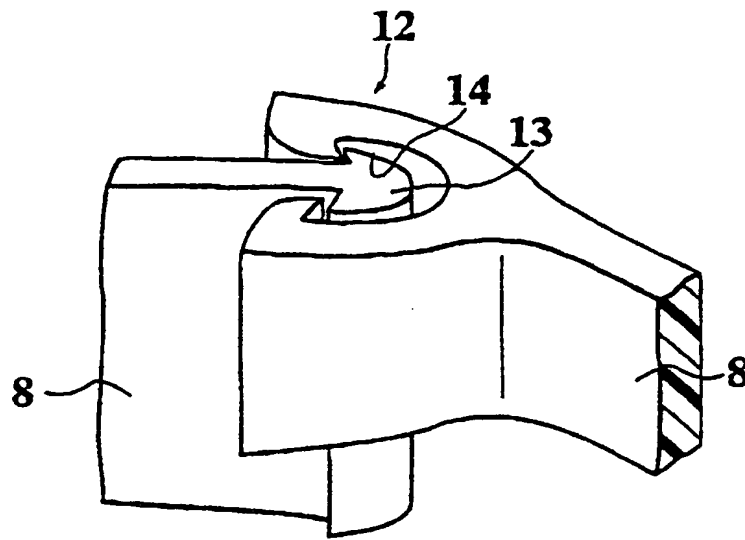
**FIG.3**



**FIG.4**



**FIG.5**



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP98/04228

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> Int.Cl <sup>6</sup> B60R21/20, B60R21/22		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) Int.Cl <sup>6</sup> B60R21/16-21/32		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1998 Toroku Jitsuyo Shinan Koho 1994-1998 Kokai Jitsuyo Shinan Koho 1971-1998 Jitsuyo Shinan Toroku Koho 1996-1998		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, 09-104307, A (Tokai Rika Co., Ltd.), 22 April, 1997 (22. 04. 97), Par. Nos. [0002] to [0004] ; Fig. 4 (Family: none)	1-10
Y	JP, 09-136596, A (NSK Ltd.), 27 May, 1997 (27. 05. 97), Par. No. [0014] ; Fig. 4 (Family: none)	1-10
Y	JP, 09-164894, A (Takata Inc.), 24 June, 1997 (24. 06. 97), Figs. 2 to 6 (Family: none)	1-10
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
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Date of the actual completion of the international search 15 December, 1998 (15. 12. 98)		Date of mailing of the international search report 22 December, 1998 (22. 12. 98)
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